Sulfur deficiency and nitrogen deficiency look very similar and often occur together. If there has been a lot of rain and nitrogen is low, sulfur is probably low as well. Plant tissue analysis is the best way to identify a deficiency.

—Blossom-end rot and calcium

As already mentioned, tomatoes have a high calcium requirement. Applying lime according to soil test recommendations will usually meet this need. However, it may be beneficial to apply additional calcium to fields with very sandy soils if cation exchange capacity (CEC) values on an NCDA&CS soil test report are less than 3.0. In such cases, sidedress with calcium nitrate.

During dry periods, blossom-end rot may occur even when calcium levels are adequate. Try to prevent water stress by mulching plants and irrigating, if possible.

If blossom-end rot occurs, treat it with a foliar application of calcium. Mix the solution at a rate of 4 lb of calcium nitrate or calcium chloride per 100 gallons of water. Apply two to three times a week, beginning when the second fruit clusters bloom. Other products, such as calcium chelates, may also be available. As with any products, follow label directions.

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NOTE 7: Fertilization of Trellised & Staked Tomatoes

Tomatoes, like many vegetables, require a high level of fertility for desired production. One of the most critical aspects of soil fertility associated with tomato culture is correction of soil acidity by lime application. A soil pH of 6.5 promotes root system health and plant nutrient availability throughout the season.

Low soil pH can be harmful to plants. It increases the availability of elements like aluminum and manganese that can be toxic to plant roots. It decreases availability of essential nutrients like calcium and magnesium. As a result, it increases the tendency for blossom-end rot.

When the soil pH is around 6.5, tomatoes take up enough calcium and magnesium for optimal plant growth and fruit development. Magnesium levels are most often a concern when tomatoes are grown on light-colored, sandy soils. When soil pH is low, the best way to provide enough calcium and magnesium is to apply lime.

Lime Sources

For agricultural purposes, there are two types of lime: calcitic and dolomitic. Calcitic lime is calcium carbonate ($CaCO_3$). It contains no magnesium. Dolomitic lime is a mixture of calcium and magnesium carbonates ($CaMg(CO_3)_2$) and contains a minimum of 120 lb magnesium per ton.

Most agricultural lime available in North Carolina is dolomitic. Generally, it is preferred because it supplies magnesium. However, when magnesium levels are adequate, especially on the fine-textured soils of the mountains and piedmont, calcitic lime can be used without concern.

Low levels of magnesium are indicated on the soil test report by a "$" symbol in the Mg column of the "Recommendations" section. When soil pH and magnesium are both low, apply dolomitic lime.

If the soil report indicates that magnesium is low but lime is not needed, apply magnesium at a rate of 25–30 lb/acre from a readily soluble source such as sulfate of potash magnesia (0-0-22, 11.5% magnesium).

Lime Rates, Timing and Application

The soil test report lime recommendation is given in units of tons per acre. This amount should raise soil pH to about 6.5. However, the actual pH obtained will vary depending on soil texture, lime quality (particle size, neutralizing value) and method of application (depth of incorporation).

If a soil test recommends lime, apply it as soon as possible to allow time for soil acidity to be neutralized. For the best results, use a high-quality, agricultural-grade lime and incorporate it thoroughly into the upper 6 to 8 inches of soil. Since lime is not very water soluble, it does not move easily down into the soil. Therefore, spreading lime on the soil surface after bedding or planting is not very effective and should only be done to correct a serious pH problem that is diagnosed during the growing season.

Soil texture affects the lime requirement. Very coarse-textured soils in the coastal plain may need lime every year. Fine-textured soils and those with high levels of organic matter typically require lime every two to three years. Where high rates of acid-forming nitrogen fertilizers are used, lime may be needed more often.

Preplant Fertilization

—Piedmont and mountain soils

For determinant varieties like 'Mountain Pride', broadcast 40–60 lb N per acre and all of the recommended P_2O_5 and K_2O. Incorporate the fertilizer into the soil. Sidedress the remaining nitrogen (50 lb/acre) when the first fruit clusters are formed. The total nitrogen rate ranges from 90 to 120 lb/acre.

For stimulation of early growth, apply a water-soluble, high-phosphate starter fertilizer at transplanting. Use 2–4 lb material per 100 gallons of water. Since the starter rate is so low, do not reduce the rate of the recommended fertilizer to account for it.

—Coastal plain soils

Follow the preplant and sidedress fertilization schedule recommended for the mountain and piedmont regions. The production season is shorter in the coastal plain due to the effects of high atmospheric temperatures on maturity.

Nitrogen and potassium leach from sandy coastal plain soils when rainfall is heavy. When this occurs, apply additional N as well as an equivalent amount of K_2O. For example, if you sidedress with 50 lb N per acre, include 50 lb K_2O. Base the need for additional nitrogen and potassium on current soil tests and plant tissue analyses.

Special Nutrient Concerns

—Boron

Tomatoes grown at the recommended soil pH of 6.5 may show signs of boron deficiency. Lack of boron causes brittle stems, dieback of growing tips, and deformed fruit. To alleviate this problem, apply boron at a rate of

- 2 lb/acre on piedmont and mountain soils and
- 1 lb/acre on sandy coastal plain soils.

To ensure uniform distribution, mix the boron fertilizer thoroughly with your broadcast fertilizer.

If soil application is not practical, apply boron to the foliage according to your regular spray schedule. Use 1–2 lb/acre of a 20.5% B material at two-week intervals for a total of three applications. Spray applications should start two to three weeks after transplanting.

Plants need boron only in very small amounts. Excessive rates can be toxic. Therefore, calculate the rate of application carefully, using this equation:

$$(\textit{lb boron needed per acre} \times 100) \div \textit{\% boron in fertilizer} = \textit{lb boron fertilizer required per acre.}$$

—Sulfur

Like nitrogen, sulfur is also subject to leaching on sandy soils. On the soil test report, a sulfur index (S-I) of 25 or below is considered low. When this is the case, apply 15–30 lb/acre of sulfur at planting. Use the higher rates on sandy soils or where a history of sulfur deficiency is known.